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Ministry of Earth Science



## Pacer Initiative

Posted On: 24 MAR 2022 1:19PM by PIB Delhi

Polar Science and Cryosphere Research (PACER) scheme comprising the Antarctic program, Indian Arctic program, Southern Ocean program and Cryosphere and Climate program is implemented successfully through National Centre for Polar and Ocean Research (NCPOR), an autonomous institute under the Ministry of Earth Sciences.

# *Let's Deconstruct*

- What is PACER?
- Which Ministry implements it?
- Which institution is nodal agency?
- What is Cryosphere?
- What are components of PACER?
- Any other Similar Schemes?

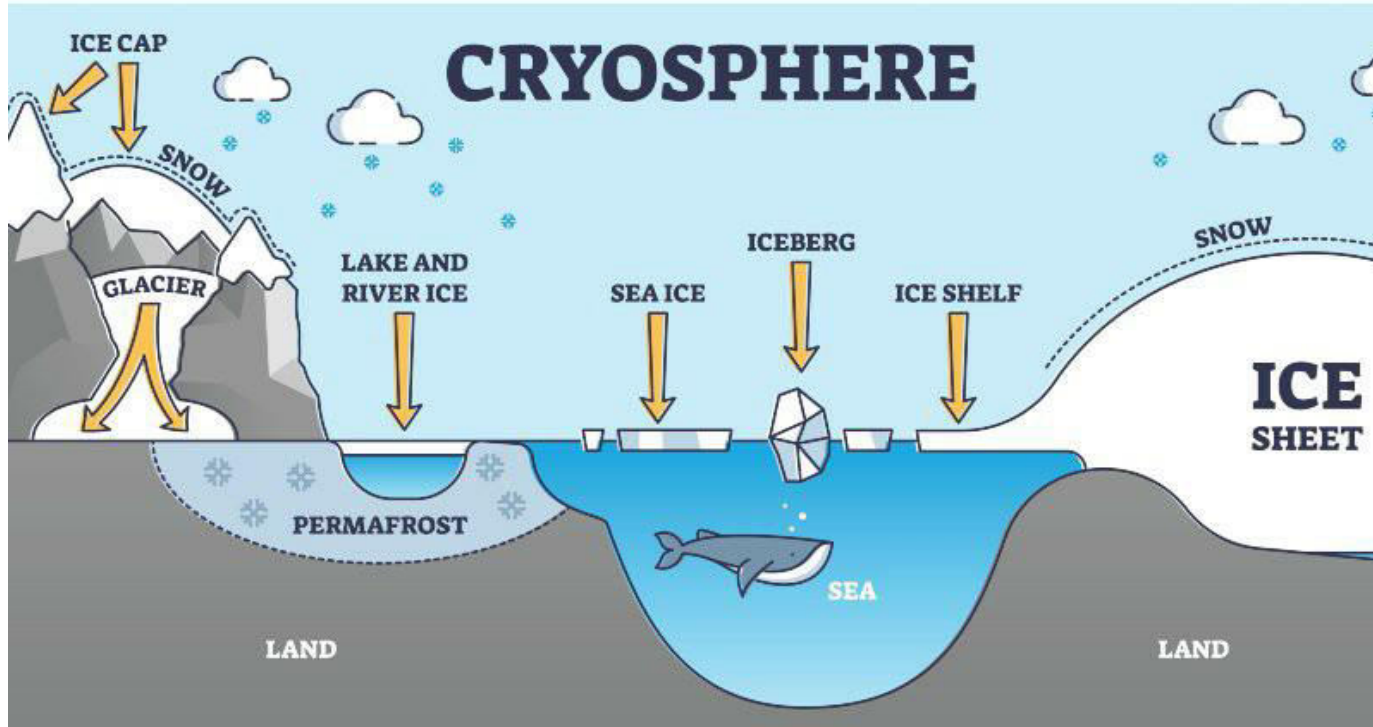
# *PACER Scheme Extended*

- The Polar Science and Cryosphere (PACER) scheme has been approved for continuation during 2021-2026. It was launched under the 12<sup>th</sup> FYP (2012-2017).
- Polar Science and Cryosphere Research (PACER) scheme comprises the Antarctic program, Indian Arctic program, Southern Ocean program and Cryosphere and Climate program.
- PACER is being implemented successfully through National Centre for Polar and Ocean Research (NCPOR), an autonomous institute under the Ministry of Earth Sciences in Goa.

# What is Cryosphere?

- Cryosphere is the **frozen water part of the Earth system**. These are **places on Earth that are so cold that water is frozen solid**.
- Cryosphere areas are snowy or icy regions, which are subject to temperatures below  $0^{\circ}\text{C}$  for at least part of the year.
- Cryosphere includes **polar areas and the continental ice sheets found in Greenland and Antarctica, as well as ice caps, glaciers, and areas of snow and permafrost**.

# What is Cryosphere?



# 6 Components of PACER

- Overall objective: To improve our understanding of Polar Science and cryosphere system.

1. **Construction of polar research vessel**

NCPOR initiated the preliminary work towards the implementation of the programme during 2008-09.

2. **Construction of the third research base in Antarctica**

3. **Indian scientific endeavours in the Arctic**

4. **Polar expeditions to Antarctica**

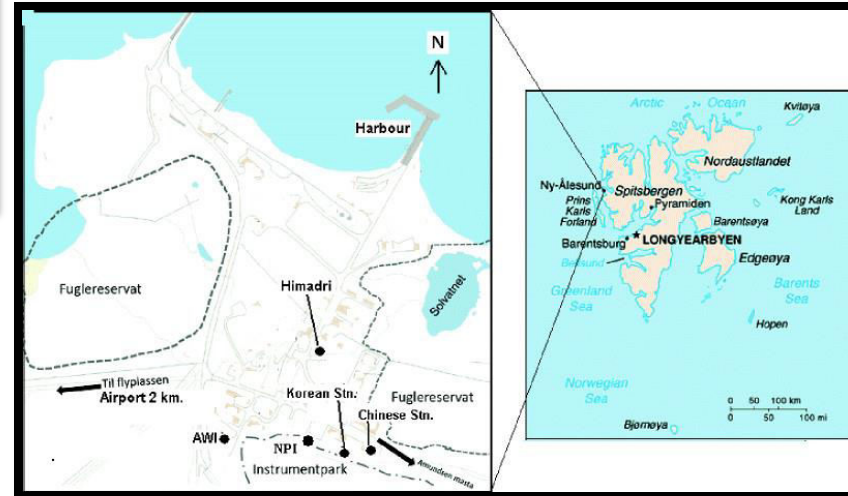
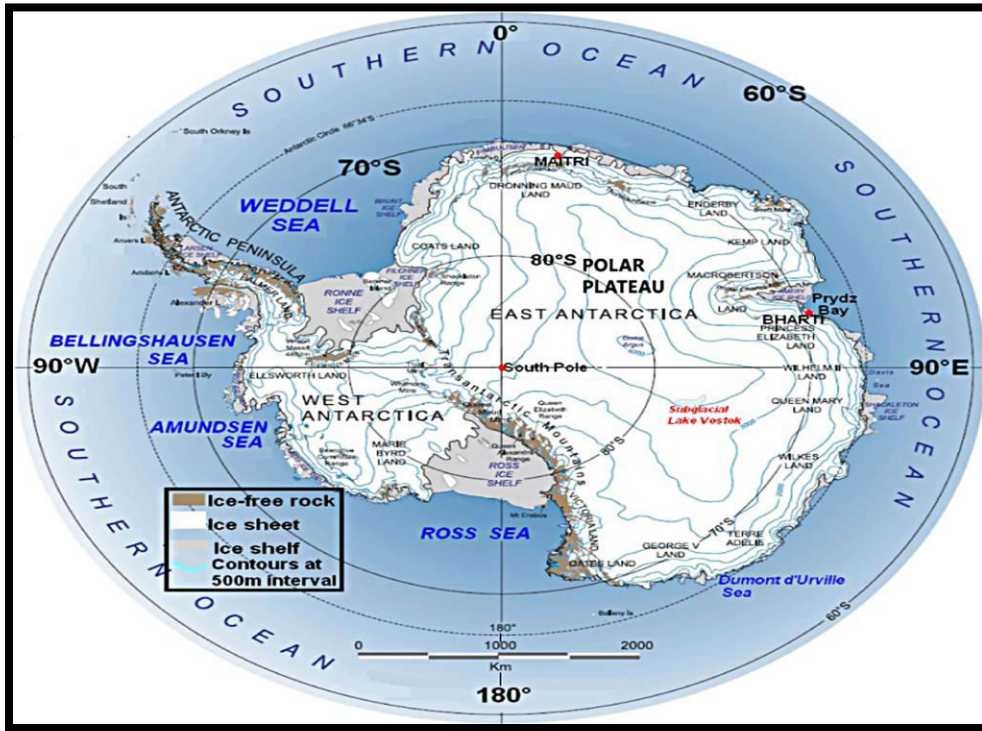
5. **Replacement of Maitri station**

6. **Southern Ocean**

To understand the dynamics of the Southern Ocean



FYI



# Deep Ocean Mission

Cabinet Committee on Economic Affairs (CCEA)

## Cabinet approves Deep Ocean Mission

Posted On: 16 JUN 2021 3:33PM by PIB Delhi

The Cabinet Committee on Economic Affairs chaired by Prime Minister Shri Narendra Modi, has approved the proposal of Ministry of Earth Sciences (MoES) on "Deep Ocean Mission", with a view to explore deep ocean for resources and develop deep sea technologies for sustainable use of ocean resources.

The estimated cost of the Mission will be Rs. 4077 crore for a period of 5 years to be implemented in a phase-wise manner. The estimated cost for the first phase for the 3 years (2021-2024) would be Rs. 2823.4 crore. Deep Ocean Mission will be a mission mode project to support the Blue Economy Initiatives of the Government of India. Ministry of Earth Sciences (MoES) will be the nodal Ministry implementing this multi-institutional ambitious mission.

# Deep Ocean Mission

## DEEP OCEAN MISSION

- Deep Sea Mining through 'Underwater Vehicles' and 'Underwater Robotics'
- Asserting exclusive rights to explore polymetallic nodules from seabed **over 75,000 sq km of areas in international water**
- Estimated polymetallic nodules resource potential: **380 million tonnes (MT)**

- Development of ocean climate change advisory services
- Technology for sustainable utilisation of marine bio-resources

### THESE POLYMETALLIC NODULES CONTAIN

Manganese	92.6 MT
Nickel	4.7
Copper	4.3
Cobalt	1

(\*figures are rounded off)

- Deep ocean survey and exploration
- Energy from the ocean and offshore-based desalination
- Krill fishery from southern ocean

Deep-ocean polymetallic nodules form on or just below the vast, sediment-covered, abyssal plains of the global ocean.

Polymetallic nodules primarily consist of **precipitated iron oxyhydroxides** and manganese oxides, onto which metals such as nickel, cobalt, copper, titanium and rare earth elements sorb.

The enormous tonnage of nodules on the seabed, and the immense quantities of critical **metals that they contain, have made them a target for future mining operations.**



Cabinet approves continuation of the umbrella scheme "Ocean Services, Modelling, Application, Resources and Technology (O-SMART)"

The umbrella scheme to cost of Rs. 2177 crore

# What is O-SMART scheme?

- O-SMART scheme encompasses seven sub-schemes
  1. Ocean Technology (**OT**)
  2. Ocean Modelling and Advisory Services (**OMAS**)
  3. Ocean Observation Network (**OON**)
  4. Ocean Non-Living Resources
  5. Marine Living Resources and Ecology (**MLRE**)
  6. Coastal Research and Operation
  7. Maintenance of Research Vessels

# What is O-SMART scheme?

- O-SMART is implemented by the following five institutes of the MoES.
  1. National Institute of Ocean Technology (NIOT), **Chennai**
  2. Indian National Centre for Ocean Information Services (INCOIS), **Hyderabad**
  3. National Centre for Coastal Research (NCCR), **Chennai**
  4. Centre for Marine Living Resources & Ecology (CMLRE), **Kochi**
  5. National Centre for Polar and Ocean Research (NCPOR), **Goa**

# What is O-SMART scheme?

1. Marine Living Resources Programme
2. National Centre for Coastal Research
3. Ocean observation and network
4. Ocean advisory and information services
5. Ocean—modelling data assimilation and process specific observations
6. Ocean science and technology for islands
7. Harnessing **ocean energy** for generating freshwater
8. **Manned and unmanned underwater vehicles**
9. Marine sensors, ocean electronics and acoustics
10. Operating and maintaining research vessels
11. Seafront Research
12. Facility Studies on **Gas hydrates/Polymetallic nodules/Polymetallic Sulphides**
13. Geoscientific studies of **exclusive economic zone**
14. Extension of the continental shelf
15. Deep Ocean Mission (**DOM**)



# Matsya 6000



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## Indigenous submersible vehicle Matsya 6000 will be ready as planned for Samudrayaan: NIOT Director



# Matsya 6000

- Matsya 6000 will be indigenously developed manned underwater submersible vehicle capable of taking three humans to a depth of 6,000 m.
- According to National Institute of Ocean Technology (NIOT), Chennai, Matsya 6000, will be ready as originally planned for its launch in 2024 for the Samudrayaan Mission.



# Matsya 6000

- Matsya 6000 is a manned submersible, designed to carry three people in 2.1 meter diameter Titanium Alloy Personnel Sphere.
- It is being developed by the Ministry of Earth Sciences and NIOT, Chennai, under the aegis of Deep Ocean Mission.
- It will have an operational endurance of 12h and systems to support emergency endurance up to 96h for deep ocean exploration of non-living resources such as polymetallic manganese nodules, gas hydrates, hydro-thermal sulphides and cobalt crusts, located at a depth between 1,000 and 6000 meters.